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(54) COIN DISPENSING MACHINES

(71) We, KABUSHIKI KAISHA SEGA ENTERPRISES, a Japanese body corporate, of 2—12, Haneda 1-chome, Ota-ku, Tokyo, Japan, do hereby declare the invention, for

which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to coin dispensing machines for dispensing either legal coins or dummy coins to be used for playing machines such as the so-called "slot machines".

According to the present invention there is provided a coin dispensing machine comprising a coin storage container and a rotary disc of electrically conductive material rotatably mounted at the bottom of the container for discharging the coins stored in the container one by one, a part or the whole of the inner wall surface of the coin storage container being electrically conductive and being electrically insulated from the rotary disc; the machine further comprising a detector device for detecting the presence of coins stored in the container, this device including means for measuring an electrical resistance connected between the electrically conductive wall surface of the coin storage container and the rotary disc to detect electrical interconnection thereof by a pile of electrically conductive coins.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, wherein:

Figure 1 is a general perspective view of a coin dispensing machine in a cabinet and incorporating a coin storage detector device,

Figure 2 is a perspective view to an enlarged scale of an important part of the detector device as viewed from the front,

Figure 3 is a perspective view of the part shown in Figure 2, as viewed from the rear, and

Figure 4 is a detailed front view of the part of Figures 2 and 3,

In the drawings, reference numeral 1 designates the cabinet for housing the coin dispensing machine 2. The cambinet 1 is provided with a coin intake slot 3 at the top of its front panel and a coin dispensing port 4 at the bottom of the front panel.

Reference numeral 5 (Figure 3) designates a base member of the coin dispensing machine 2, this base member 5 being tilted at an angle. On the base member 5 there is rotatably mounted a rotary disc 6 (Figures 2 and 4) which is of electrically conductive material and which is adapted to be rotationally driven in the direction of arrow X by means of a motor 7 (Figure 3).

A coin storage container 8 having an electrical insulation coating applied to the major part of its surface (including the surface of a flange and the inner surfaces of holes for receiving stud bolts), is detachably mounted on the base member 5 by means of stud bolts 9 so as to be electrically insulated from the base member 5. As best seen in Figure 2, on a bottom portion 8a of the inner wall surface of the container 8 the insulation coating is omitted.

On the front surface of the rotary disc 6 are provided a number of very low protrusions 10, and a number of semi-circular protrusions 11 projecting from the surface of the rotary disc 6 at predetermined intervals in the circumferential direction of the disc 6. Along the outer circumference of the surface of the disc 6 there are locking members 12 positioned centrally of the intervals between the semi-circular protrusions 11. In use, a number of coins of low value are stored in the container 8 with some held in the annular portion between the protrusions 11 and the locking members 12 on the surface of the rotary disc 6.

A coin kicker 14 is provided adjacent the outer circumference of the disc 6, which coin kicker is adapted to be driven by a solenoid 13. Between the coin kicker 14 and a support rod 15 is stretched a tension spring 16. A coin separator 17 is disposed at the position where the protrusions 11 pass.

Above the coin separator 17 is disposed a coin counter lever 18. A counter switch 19 is mounted on the rear of the base member

5 so as to make contact with a movable piece 18a of the counter lever 18 to be actuated thereby.

Reference numeral 20 designates a coin outlet provided in the base member 5 and connected to the coin dispensing port 4 through a chute not shown.

The base member 5 and the coin storage container 8 are electrically connected to opposite terminals of an electric resistance measuring instrument not shown *via* lead wires 21 and 22, respectively.

When a predetermined coin (of higher value than the coins stored in the container 8) such as, for instance, a 100-yen coin where the low value coins are 10-yen coins, is fed into the coin intake slot 3, the higher value coin is detected by a coin detecting machine not shown. In response to this detection the motor 7 operates to rotate the disc 6 and the solenoid 13 is energized to lower the coin kicker 14 below the surface of the disc 6. The low value coins stored in the storage container 8 are well stirred by means of the protrusions 10 and picked up one by one by the protrusions 11 and the locking members 12, the coins moving from the bottom to the top of the disc 6 along the direction of rotation X, separating from the disc 6 one by one in the horizontal direction Y under the action of the coin separator 17, and finally being discharged one by one from the coin outlet 20 to the coin discharging port 4.

During the period whilst the low value coins 23 are separated and discharged one by one the coin counter lever 18 is depressed each time one of the coins 23 passes thereby, so that the counter switch 19 is closed by the movable piece 18a of the coin counter lever 18 once per each coin. When the closure pulses formed by this switch 19 have been counted up to a predetermined number such as, for instance, ten, the power supply to the solenoid 13 and the motor 7 is interrupted by a pulse produced from a coin number detector device not shown, and thereby the dispensing of the low value coins is automatically stopped.

Thus, when a coin of predetermined high value is fed into the slot 3, the corresponding number of low value coins 23 equivalent to the high value are automatically dispensed.

Under the condition that more than a predetermined minimum number of low value coins 23 are stored in the coin storage container 8, one or more coins 23 making contact with the uninsulated portion 8a at the bottom of the coin storage retainer 8 and one or more coins 23 contacting the rotary disc 6 will be electrically connected by the intermediary of other irregularly piled coins 23, and this electrical connection can be detected by the electrical resistance measurement instrument not shown *via* the electrical connection between the disc and the base member 5 and *via* the lead wires 21 and 22. This has the effect that the operation of the coin dispensing machine can be continued normally.

As the dispensing of the low value coins 23 proceeds, the amount of these coins within the coin storage container 8 is successively reduced. Hence, it is to be noted that since the coins stored in the container 8 are repeatedly stirred by the protrusions 10 and 11 on the rotary disc 6 which rotates in the anti-clockwise direction (arrow X) as viewed in Figure 2, the coins remaining in the coin storage container 8 form an obliquely extending pile on the inner wall surface as viewed in Figure 2 of the disc 6, rather than merely being heaped on the central bottom portion 8a, where there is no insulation coating, clear of the disc 6. Therefore, so long as at least one coin at the bottom of the pile of remaining coins is positioned on the portion 8a, the electric connection between the coin storage container 8 and the rotary disc 6 is retained.

However, if the number of coins remaining in the storage container 8 is so reduced that the pile of coins remaining is entirely positioned outside the portion 8a, that is, on the right side of the portion 8a as viewed in Figure 2, then the electrical connection between the portion 8a at the bottom of the coin storage container 8 and the rotary disc 6 is interrupted. This interruption is detected by the electrical resistance measurement instrument not shown for actuating warning buzzers or lamps.

It will be appreciated that the dimensions, configuration and location of the non-insulated container surface portion 8a can be chosen according to the minimum amount of coins required for normally and reliably operating the coin dispensing machine and the shape of the pile of remaining coins which in turn depends upon the method of stirring the stored coins. In the case that the shortest distance between the boundary of the non-insulated container surface portion and the centre of the pile of remaining coins is longer than in the illustrated embodiment, then the electrical resistance measurement instrument will detect a relatively larger minimum amount of stored coins, whereas if this distance is shorter, then the instrument will detect a relatively smaller minimum amount of stored coins. In an extreme case, it is possible to have the entire inner surface of the coin storage container non-insulated. Then, as best seen in Figure 2, since the bottom inner surface of the coin storage container 8 is tilted downwardly towards the rotary disc 6, even a single coin remaining in the coin storage container 8 will serve to make electrical connection between the coin storage container and the rotary disc 6.

Therefore, in this case, only when the coin storage container 8 becomes completely empty, can the electrical resistance measurement instrument detect the minimum amount of storage, which is then zero. However, even in such a case, a few coins would be possibly held on the rotary disc 6 between the protrusions 11 and the locking members 12 as shown in Figure 2. Accordingly, such a construction is practically applicable to a dummy coin dispensing machine which changes one legal coin into one dummy coin or a few dummy coins for use in a playing machine. It is of course necessary in all cases that the coins or dummy coins be electrically conductive.

The construction of the machines described above is such that it is possible to determine the amount of coins stored in the coin storage container in an extremely accurate and reliable manner without failure of the device, because the coin senser making contact with the coins within the coin storage container does not irregularly move with respect to the container, and because the coin senser is adapted to detect the variation in an electrical state, rather than for example variation in a mechanical state, of the coins while being stirred. In addition since no movable parts are specifically provided except for the coin dispensing mechanism, the mechanical structure of the device is simple, the manufacturing cost is low, and the device has a good durability.

WHAT WE CLAIM IS:—

1. A coin dispensing machine comprising a coin storage container and a rotary disc of electrically conductive material rotatably mounted at the bottom of the container for discharging the coins stored in the container one by one, a part or the whole of the inner wall surface of the coin storage container being electrically conductive and being electrically insulated from the rotary disc; the machine further comprising a detector device for detecting the presence of coins stored in the container, this device including means for measuring an electrical resistance connected between the electrically conductive wall surface of the coin storage container and the rotary disc to detect electrical interconnection thereof by a pile of electrically conductive coins.

2. A coin dispensing machine as claimed in claim 1, wherein the rotary disc is rotatably mounted on a stationary base member in an electrically conductive relationship therewith, and the electrical resistance measuring means is connected between the electrically conductive wall surface of the coin storage container and the rotary disc *via* the stationary base member and conductor wires.

3. A coin dispensing machine as claimed in claim 1 or 2, wherein the coin storage container is made of electrically conductive material and the major part of its inner wall surface has an electrical insulation coating, the remaining part being uninsulated.

4. A coin dispensing machine as claimed in claim 3, wherein the dimensions, configuration and location of the uninsulated part of the inner wall surface are determined in accordance with what is to be the desired number of coins to be stored in the storage container.

5. A coin dispensing machine as claimed in claim 1 or 2, wherein the coin storage container is made of conductive material and its inner wall surface has its electrically conductive surface exposed entirely.

6. A coin dispensing machine substantially as hereinbefore described with reference to the accompanying drawings.

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1456154 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

FIG. 1

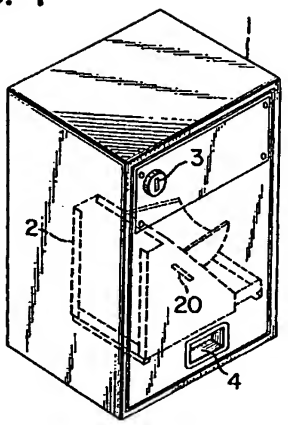
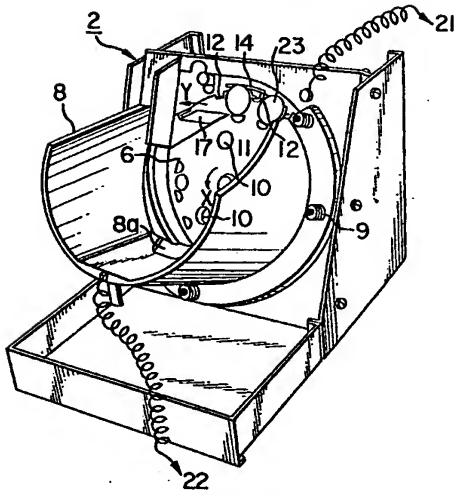


FIG. 2



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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

FIG. 3

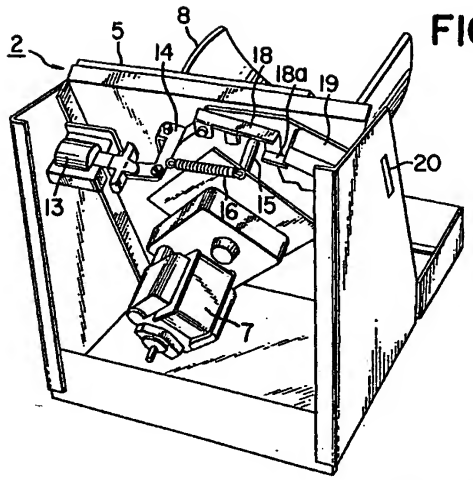

FIG. 4